

Primula longipes subsp. *bayburtensis* Sefali, Yapar & Demir (Primulaceae): A new taxon from north-eastern Anatolia, Türkiye

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Abstract

The new taxon, *Primula longipes* subsp. *bayburtensis* Sefali, Yapar & Demir, **subsp. nov.** (Primulaceae) is described and illustrated from Bayburt Province, Türkiye. It is morphologically assigned to *Primula* sect. *Crystallophlomis* based on its long scapes, lanceolate and denticulate leaf with long petiole and hairless habit, fruits longer than calyx and covered by farina on the scape. This new taxon is similar to *Primula longipes* and *P. nivalis* subsp. *turkestanica*; it can also be easily distinguished by its calyx divided ratio, thurm flowers (unwidened corolla tube shape and length) and capsules (length) futures.

Key words: *Crystallophlomis*, Flora of Türkiye, new taxon, *Primula*

Introduction

The genus *Primula* L. (1753:142) is found in temperate parts of the Northern Hemisphere, extending from East Asia and Europe to the subarctic zone. Based on morphological features, the ca. 500 species in the genus have been divided into 37 sections (Richards 2003; Smith and Fletcher 1942). With about 300 species spread throughout 24 sections, the Himalayan-Hengduan Mountains in particular, located in south-western China, are a hotspot for *Primula* diversity (Hu 1994; Hu and Kelso 1996).

Since the majority of *Primula* species produce lovely, eye-catching flowers, several species that are very ornamental and can be easily cultivated and multiplied are popular ornamental plants. As pot and garden plants, *P. malacoides*, *P. obconica* and *P. × polyantha*, for instance, are currently considered key floricultural crops (Kato et al. 2018). These attractive flowering plants of *Primula* have attracted the attention of not only gardeners, but also researchers. *Primula* flowers have been popular for 150 years (Wu et. al. 2023) since Darwin made his pioneering work on flower polymorphism in *Primula* (Darwin 1877). The genus species are mostly (92%) distyles (Wang et al. 2021) that, usually, consist of two flower morphs (i.e. long-styled or short-styled) that differ reciprocally in stigma and anther height in a tubular flower (Barrett 2019).



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Primula sect. *Crystallophlomis* (also referred to as Nivalid *primulas*) are often long, erect (about 40 cm), with a basal rosette of lanceolate, somewhat fleshy leaves and typically have white or pale yellow farinose below. The section has the potential to develop multiple flower whorls and pink, purple, white, cream or generally magenta flowers. Due to its usual location, its buds are covered by snow for a considerable amount of time. *Primula nivalis* Pallas, which is found in central Asia and southern Siberia, is the section's type species. It has a robust habit, broad, lanceolate leaves with serrate margins, a tall, farinose scape up to 40 cm high and distyles flowers (Kelso 1987). *P.* sect. *Crystallophlomis* has four subsections: subsection *Agleniana*, subsection *Calliantha*, subsection *Crystallophlomis* and subsection *Maximowiczii* (Rankin 2012). Subsection *Crystallophlomis* has rotational symmetrical flowers, ca. 2.5 cm resting buds, farinose, green or white petioles, corolla lobes not reflexed and broad, and capsules dehiscent with valves (Rankin 2012).

Türkiye has 12 taxa of *Primula* belonging to eight species that were recognised by Lamond (1978). In the last decade, a hybrid, *Primula* × *uzungolensis*, was identified in north-eastern Türkiye (Terzioğlu et al. 2012) in the Soğanlı and Kaçkar Mountains at Trabzon, Gümüşhane, Rize, Artvin Province. The north-eastern part of Türkiye contains the richest species of the *Primula* and *Androsace* taxa. *Primula* is represented by 12 taxa and *Androsace* is represented by 8 taxa. (Lamond 1978; Terzioğlu et al. 2012; Sefali 2021; Sefali and Yapar 2022).

Our field study was undertaken in Bayburt Province within the north-eastern area of Türkiye. This Province belongs to the Soğanlı Mountains (Kırklar Mountain) chain. As a result of the field work carried out three times in June and July 2024, the new taxon was found in the south valley of Kırklar Mountain (Fig. 1). The authors noticed an interesting Nivalid *Primula* that resembled *Primula longipes* Freyn & Sint. (1896: 141), but this had a distinct long corolla tube, longer capsule and linear bracts. As a result, it was decided that this plant could be a new taxon and was named as *Primula longipes* subsp. *bayburtensis*.

Material and methods

The new taxon, *Primula longipes* subsp. *bayburtensis*, was compared with herbarium specimens at EGE, ISTE, BIN, VANF, KNYA, ANK and AIBU. Additionally, some digital herbarium materials were examined (E, K, BR, WU herbaria and G) (acronyms according to Thiers (2025)). In addition, the relevant literature was reviewed (Fedorov 1952; Lamond 1978; Kelso 1987; Hu 1994; Hu and Kelso 1996; Richards 2002; Gültepe et al. 2010; Terzioğlu et al. 2012; Rankin 2012; Kato et al. 2018). Using a stereo-binocular microscope equipped with millimetric rules, extensive morphological measurements were carried out on the new taxon material and compared with its closely related species, *Primula longipes*. Since the new taxon was found in only one valley, 20 individuals were included in the study.

A seed micrograph was taken with a scanning electron microscope (SEM). Seed properties were interpreted according to Morozowska et al. (2011). Paly-nological investigations were conducted with both light and scanning electron microscope (SEM). Pollen slides were prepared using the Wodehouse technique (1935) for light microscope studies. The averages and standard deviations of the measurements were calculated by light microscope. Measurements were taken for at least 25 pollen grains. The pollen terminology follows Faegri and Iversen (1975) and Punt et al. (2007).



Figure 1. Distribution map for *Primula longipes* subsp. *bayburtensis* (red circle), *P. longipes* subsp. *longipes* (black circle), *P. nivalis* subsp. *turkestanica* (blue circle) and *P. crassifolia* (purple circle).

Results and discussion

Taxonomic treatment

***Primula longipes* Freyn & Sint. subsp. *bayburtensis* Sefali, Yapar & Demir, subsp. nov.**

[urn:lsid:ipni.org:names:77362178-1](https://nomenclature.ipni.org/names/77362178-1)

Fig. 4

Diagnosis. *Primula longipes* subsp. *bayburtensis* differs from *P. longipes* subsp. *longipes* in its longer corolla tube and thurm flowers unwidening corolla throat. While *Primula longipes* subsp. *bayburtensis*'s corolla tube ca. 14 mm and calyx/corolla tube length ratio is 0.5, *P. longipes* subsp. *longipes*'s corolla tube ca. 12 mm and calyx/corolla tube length ratio is 0.7 (Fig. 3).

Type. TÜRKİYE. Bayburt • Kırklar Mountain, southern valley, river side, stony and wet places, 2950 m elev., 15 June 2024, A. Sefali, Y. Yapar & İ. Demir 1052 (holotype: VANF!; isotypes: BIN!).

Etymology. *Primula longipes* subsp. *bayburtensis* is named after the geographical province. This epithet is *bayburtensis* (in Turkish, Bayburt), referring to Bayburt Province, north-eastern Türkiye. The Turkish name for this taxon was chosen as “Bayburt çulhası” (Menemen et al. 2016).

Description. Sturdy perennial, 15–50 cm, basal bud scales long stocks formed by overlapping petioles. **Roots** thickish and fibrous. **Stem** shortly puberulent, farinose. **Leaves** rosette, petiole broadly winged, 6–8 × ca. 1 cm. **Leaf**

lamina elliptic-lanceolate 6–22 × 1.5–3 cm and near petiole shortly puberulent, farinose, base gradually thinning. Leaf margin irregularly blunt denticulate and apex bluntly acute. **Scapes** 10–38 cm, elongated to 45 cm in fruit. Inflorescence, 4–30-flowered (sometimes 2-whorled) at umbels. **Bracts** linear lanceolate, generally filiform, 2–13 mm. Flowers heterostylous. **Pedicel** 8–12 mm, elongated to 2–5.5 cm in fruit. **Calyx tubular**, 5–7 mm, divided to 3/5. **Calyx teeth**, 3.5–4.5 mm, lobes linear to lanceolate. **Corolla tube** ca. 14 mm, lobes 6–10 mm, ± broadly oblong, entire, magenta. **Pin flowers**, stamens 4–5 mm above base of corolla tube, style longer than calyx. **Thrum flowers**, stamens equalling or above (1–1.5 mm) apex of calyx, style ca. 4 mm. **Capsule** cylindrical, 2–4.5× as long as calyx. **Seed** elliptic to deltoid, yellowish, 2 × 1.5 mm (Fig. 4).

Phenology. Flowering from June to July; fruiting in August.

Seed and pollen morphology. (Fig. 5) Seed grains of *P. longipes* subsp. *bayburtensis* are elliptic to deltoid, yellowish, 2 × 1.5 mm, tuberculate, *P. longipes* subsp. *longipes* is elliptic, brownish, 2 × 1.5 mm, tuberculate. Pollen grains of *P. longipes* subsp. *bayburtensis* are prolate-spheroidal (P/E = 1.04 µm), polar axis (P) 19.17 µm (max. 20.98 µm, min. 17.73 µm), equatorial axis (E) 18.19 µm (max. 19.44 µm, min. 16.75 µm), radially symmetrical, isopolar, triparasyncolpate. Shape in polar view triangular. Exine 0.91 µm (max. 1.15 µm, min. 0.65 µm), intine 0.45 µm (max. 0.55 µm, min. 0.33 µm). Ornamentation of exine microreticulate. Additionally, pollen grains of *P. longipes* subsp. *longipes* are prolate-spheroidal (P/E = 1.07 µm). Polar axis 20.22 µm (max. 21.54 µm, min. 18.79 µm), equatorial axis 18.75 µm (max. 20.14 µm, min. 17.14 µm) radially symmetrical, isopolar, triparasyncolpate. Shape in polar view triangular. Exine 0.96 µm (max. 1.25 µm, min. 0.72 µm), intine 0.51 µm (max. 0.58 µm, min. 0.41 µm). Ornamentation of exine microreticulate.

Distribution and ecology. (Fig. 2) The new taxon is a local endemic restricted to the south valley of Kırklar Mountain in Bayburt Province, North-eastern Türkiye. It is an Euxine element (Figs 1, 2). The habitat of the *Primula longipes* subsp. *bayburtensis* is stream banks and it grows in open alpine areas. The new subspecies grows in the near vicinity of *Draba nemorosa* L., *Cardamine raphanifolia* Pourr., *Primula algida* Adams, *P. auriculata* Lam., *P. elatior* subsp. *amoena* (M.Bieb.) Greuter & Burdet, *Pedicularis nordmanniana* Bunge, *Erica spiculifolia* Salisb., *Scilla alinihatiana* Aslan & Yıldırım, *Silene lazica* Boiss. (it is found near stony places), *Erodium hendrikii* Alpınar, *Pinguicula balcanica* Casper, *Heracleum pastinacifolium* K.Koch, *Saxifraga exarata* Vill., *Minuartia aizoides* (Boiss.) Bornm. and *Poa* sp.

Taxonomic relationships. *Primula* sect. *Crystallophlomis* members are generally distributed in highly mountainous places. The new taxon belongs to the *Primula* sect. *Crystallophlomis* and subsection *Crystallophlomis* (Rankin 2012). *Primula longipes* subsp. *bayburtensis* is closely related to *P. longipes* subsp. *longipes*, *P. nivalis* Pall. subsp. *turkestanica* (Haage & Schmidt) Kovt. and *P. crassifolia* Lehm. as they all belong to the same section (section *Crystallophlomis*). According to Lamond (1978), in Turkish Flora, *P. longipes* is one of the most beautiful of the Nivalid *Primulas* and a western vicarial of the Caucasian white-flowered *P. bayernii*, which is a synonym of *P. crassifolia* now, and also *P. nivalis* Pallas var. *farinosa* Schrenk, that is a synonym of *P. nivalis* subsp. *turkestanica*, related to *P. longipes* (Lamond 1978). The new taxon differs from *P. longipes* subsp. *longipes* by its corolla tube and calyx length ratio and thurm flower



Figure 2. Kirklar Mountain: **A** southern valley of Kirklar Mountain **B** habitat of *Primula longipes* subsp. *bayburtensis* (early period) **C** late period of new taxon **D** fruiting time of new taxon.

characters (Table 1). Differing from other taxa, *P. nivalis*. subsp. *turkestanica* growing in Kazakhstan, Kirgizstan, Mongolia and Xinjiang, its bracts shape, calyx divided ratio and corolla tube and calyx length of ratio etc. *P. crassifolia*,



Figure 3. Morphologically related taxon in terms of flower, corolla tube and calyx ratio. **A** Pin flower of *Primula longipes* subsp. *bayburtensis* **B** thrum flowers of *P. longipes* subsp. *bayburtensis* **C** thrum flowers of *P. longipes* subsp. *longipes*.

Table 1. Morphological comparison of *Primula longipes* subsp. *bayburtensis* with *P. longipes* subsp. *longipes* and *P. nivalis* subsp. *turkestanica*.

Characters	<i>Primula longipes</i> subsp. <i>bayburtensis</i>	<i>Primula longipes</i> subsp. <i>longipes</i>	<i>P. nivalis</i> subsp. <i>turkestanica</i>
Bracts	numerous, linear lanceolate, generally filiform.	several, narrow-triangular.	narrowly lanceolate.
Calyx	tubular, 5–7 mm, divided to 3/5.	campanulate, 6–12 mm, divided to 3/5.	tubular, 6–11 mm, divided to ½.
Calyx teeth	3.5–4.5 mm, lobes linear to lanceolate.	ca. 9 mm, lobes linear to lanceolate.	3–5.5 mm, lobes lanceolate.
Corolla	corolla tube ca. 14 mm, lobes 6–10 mm, ± broadly oblong, entire, magenta.	corolla tube 6–12 mm, lobes 6–9 mm, ± broadly oblong, emarginate or not, lavender-blue to reddish mauve.	corolla tube 8–15 mm, lobes 7–14 mm, oblong, margin entire, violet to purple.
Calyx/Corolla tube length	0.5	0.7	0.4
Thrum flowers:	stamens equalling or above apex of calyx; 1–1.5 mm, style ca. 4 mm.	stamens bearing apex of calyx or above; style ca. 3–3.5 mm.	stamens slightly above apex of calyx; style ca. 2 mm.
Capsule	cylindrical, 2–4.5× as long as calyx.	oblong, 1–2× as long as calyx.	oblong, 1–2× as long as calyx.

spread across North Caucasus and Transcaucasus, is similar to the new taxon, but its white-flowered habit is distinctive.

It is not surprising to find a new taxon from the province in northeast Türkiye as this area has a rich diversity of *Androsace* and *Primula* species (Lamond 1978; Terzioğlu et. al. 2012; Sefali 2021; Sefali and Yapar 2022). *P. longipes* subsp. *bayburtensis* is found in Bayburt, Kırklar Mountain, north-eastern Türkiye. The new taxon’s spread is restricted to the southern valley of Kırklar Mountain.

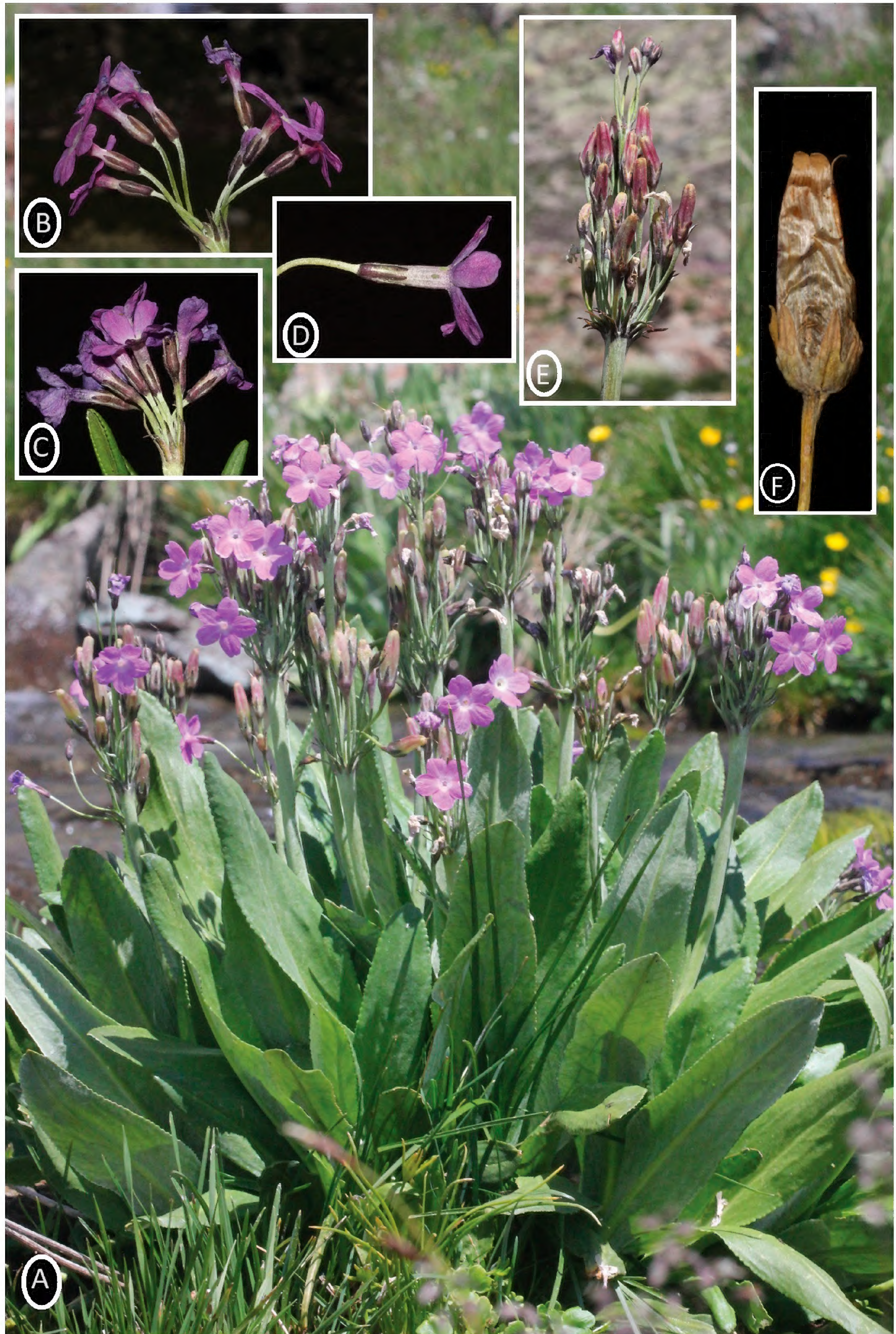


Figure 4. *Primula longipes* subsp. *bayburtensis*: **A** Habitus **B, C** inflorescence **D** flower (calyx and corolla tube) **E** fruits and bracts **F** fruit.

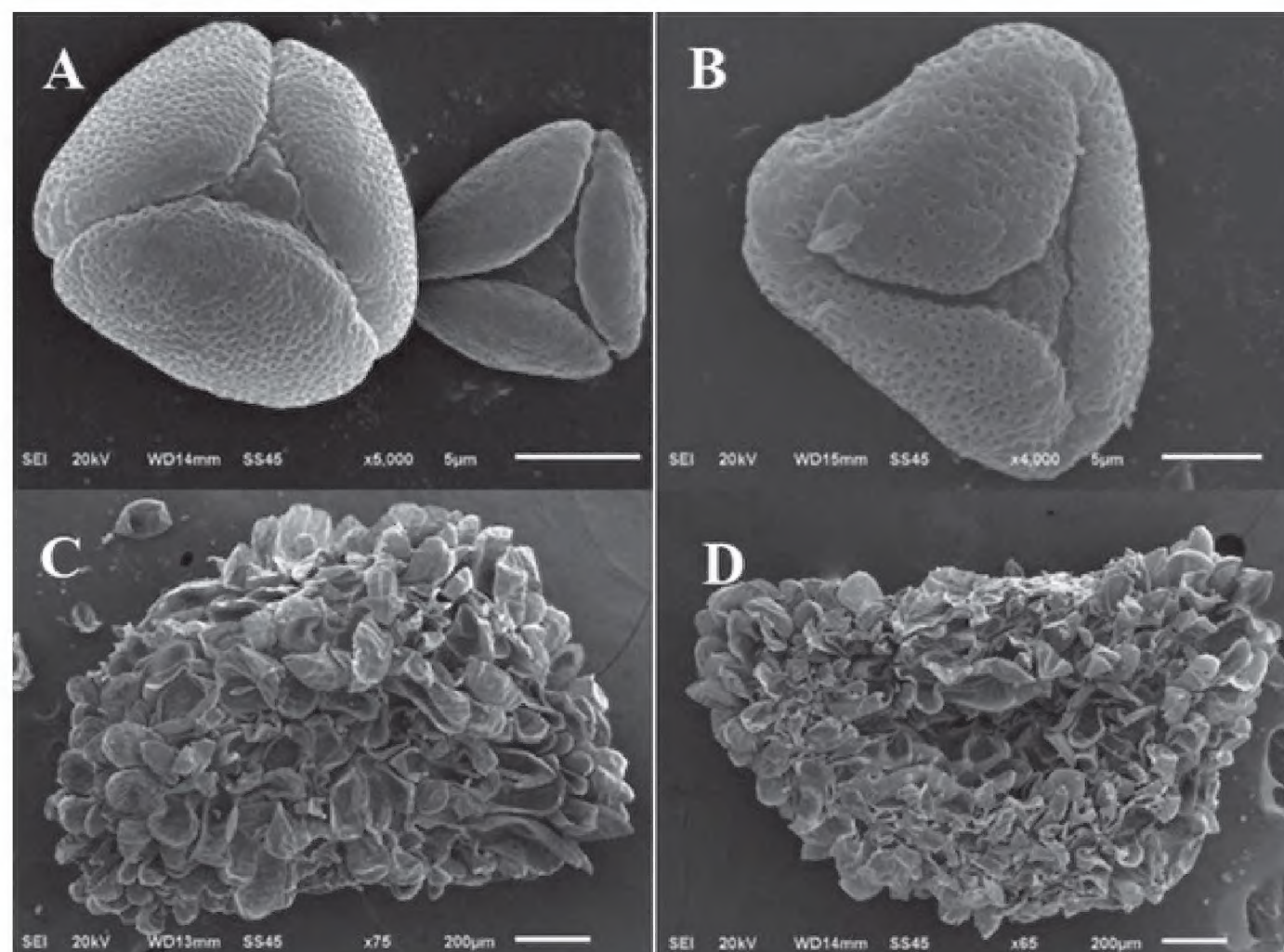


Figure 5. SEM pollen (thurm flowers) and seed grain photographs: **A–C** *Primula longipes* subsp. *bayburtensis* **B–D** *P. longipes* subsp. *longipes*.

This valley is exposed to the Black Sea climate, the air currents from the south and fed by the Çoruh River. Probably, this climate differentiation challenged the new taxon for some adaptation. This environmental factor may be the reason for the new taxon's changes in the flower futures (calix divided ratio, thurm flowers, corolla tube and calyx length of ratio).

Examined specimens. *Primula longipes* subsp. *longipes* – TÜRKİYE • Gümüşhane, in saxosis tracti Karagolldagh circa lacum Bojuk-goll, 2500 m elev., 31 vii 1894, Sintenis 7307 (E00024014!, L2650049, G, K000732926, BR/BR0000005297337, WU0069730) • Erzurum, Erzurum Province (bordering Rize Province), İspir District (bordering İkizdere District), Kaçkar Dağları (Kaçkar Mountains), about 1.7 km S of Ovit Dağı Geçidi (Ovit-Pass, 2640 m elev.). 40.611027°N, 40.78309°E, C. Gilli (WU11602); Giresun, Karagöl Dağı, 2600 m elev., 10 June 2021, A. Sefalı 690 (VANF 165225) • Rize, Upper Kavrun Valley, Kaçkar Mountains, with *Rhododendron caucasicum* populations, grazing ground, 2600 m elev., 21 June 2024, A. Sefalı 107? (BIN). *P. nivalis* subsp. *turkestanica* – KYRGYZSTAN • Talas Oblast, North West of Otmök Pass, 3554 m elev., 12 July 2008, J. Osborne 518 (K000493578). *Primula crassifolia* – GEORGIA • (E00024012). *Primula longipes* subsp. *bayburtensis* – TÜRKİYE • Bayburt; Kırklar Mountain, southern valley, river side, stony and wet places, 2950 m elev., 15 June 2024, A. Sefalı 1052 (holotype: VANF!; isotypes: BIN!).

Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

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Author contributions

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Data availability

All of the data that support the findings of this study are available in the main text.

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